Appendix 6420-T1
RF Surveys

Introduction

The appendix provides general guidance for making surveys of RF field levels near RF equipment.

RF energy can only be measured by the proper use of specialized calibrated instrumentation. To obtain meaningful measurements, the frequency and directional sensitivity of probe equipment must be well understood by the user.

RF surveys are required under several circumstances:

- post-installation leakage tests on waveguides and other high power RF equipment
- commissioning of new RF equipment
- changes in operating power for certain types of equipment setups
- whenever personnel request a survey

Follow the instrument manufacturer's procedures to ensure accurate results.

Essentially all surveys conducted at Jefferson Lab will be a search for an unintentional RF emitter: for example a leak from a waveguide that transfers RF, or a leak from a microwave oven.

Procedures

Follow a standard protocol when conducting surveys. It makes it much easier to detect and interpret changes in RF levels over time. Good records are important. Components of a thorough RF survey include the following:

Table 1: Components of an RF Survey

Component	Description
Interlocks	Describe and reference last test date.
Characterize the source	Frequency, power level, modulation, number of sources, harmonics, duty cycle, possibility of induced currents.
Site drawing	Schematic showing the source, barriers, interlocks, signs, areas normally occupied by people.
External areas	Any other areas that could receive lower but measurable emissions.
Time and date	
Meter	Model, serial number, date of last calibration.
Data	Compare to standard (ANSI/IEEE) (C95.3-1991).
Last survey	Attach copy or reference last survey.
Technician signature	

This information should be recorded and ought to be preserved at least until a subsequent survey of the same source is made. It is advisable to keep all survey data, however; it may indicate a trend over time or be useful for design and testing of similar equipment.

Special Considerations

RF equipment

- Check the RF emission frequency with the manufacturer; you may need to monitor for induced currents

Transmission line leakage

- Ensure that the meter selected has a probe length long enough to keep your hands away from hazardous voltage that is normally present in high-power amplifiers

Microwave ovens

- Normally, anisotropic (directional-sensitive) instruments are used to measure leakage around the perimeter of the oven door, to ensure that only the oven is being tested, and the measurements are not disturbed by any other sources in the immediate area.

Note:
RF surveys for leakage and microwave ovens present the most simplified surveys. It is important to note that for some sources, RF surveys may be more complicated: i.e., with radio frequency surveys in the 50–300 MHz range, the readings may be affected by the distance between your body and the survey equipment. Refer to your EH&S staff and the meter manufacturer for assistance.